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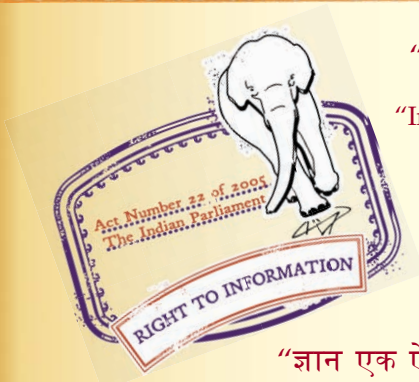
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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 10096-1-1 (1983): Recommendations for inspection, testing and maintenance of radial gates and rope drum hoists, Part 1: Inspection, testing and assembly at the manufacturing stage, Section 1: Gates [WRD 12: Hydraulic Gates and Valves]



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Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 10096 (Part 1/Sec 1) - 1983

(Reaffirmed 1990)

Indian Standard

**RECOMMENDATIONS FOR
INSPECTION, TESTING AND MAINTENANCE OF
RADIAL GATES AND THEIR HOISTS**

**PART I INSPECTION, TESTING AND ASSEMBLY AT
THE MANUFACTURING STAGE**

Section 1 Gates

(First Reprint SEPTEMBER 1993)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

RECOMMENDATIONS FOR INSPECTION, TESTING AND MAINTENANCE OF RADIAL GATES AND THEIR HOISTS

PART I INSPECTION, TESTING AND ASSEMBLY AT THE MANUFACTURING STAGE

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**AMENDMENT NO. 1 JANUARY 1993
TO
IS 10096 (Part 1/Sec 1) : 1983 RECOMMENDATIONS
FOR INSPECTION, TESTING AND MAINTENANCE OF
RADIAL GATES AND THEIR HOISTS
PART 1 INSPECTION, TESTING AND ASSEMBLY AT THE
MANUFACTURING STAGE**

Section 1 Gates

*(Cover page, page 1 and page 3, title) — Substitute 'ROPE DRUM' for
'THEIR'*

(RVD 12)

Reprography Unit, BIS, New Delhi, India

Indian Standard

RECOMMENDATIONS FOR INSPECTION, TESTING AND MAINTENANCE OF RADIAL GATES AND THEIR HOISTS

PART I INSPECTION, TESTING AND ASSEMBLY AT THE MANUFACTURING STAGE

Section I Gates

0. FOREWORD

0.1 This Indian Standard (Part 1/Sec 1) was adopted by the Indian Standards Institution on 25 November 1983, after the draft finalized by the Hydraulic Gates and Valves Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 The gates are used not only to pass large floods but also to regulate the reservoir level during minor variations in flow. The gate, in general is a structural steel frame consisting of end vertical girders with properly spaced horizontal girder between them. The spacing depends on the design water pressure and on dimensions of the gate. The frame is held apiece by secure welding or riveting.

0.3 Reference to the following Indian Standards will be found useful in implementation of this standard:

IS : 210-1978 Grey iron castings (*third revision*)

IS : 226-1975 Structural steel (standard quality) (*fifth revision*)

IS : 306-1968 Tin bronze ingots and castings (*second revision*)

IS : 318-1981 Leaded tin bronze ingots and castings (*second revision*)

IS : 823-1964 Code of procedure for manual metal arc welding of mild steel

IS : 1030-1974 Carbon steel castings for general engineering purposes (*second revision*)

IS : 1570-1961 Schedules for wrought steels for general engineering purposes

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IS : 2004-1978 Carbon steel forgings for general engineering purposes
(*second revision*)

IS : 2062-1980 Structural steel (fusion welding quality) (*second revision*)

IS : 2595-1978 Code of practice for radiographic testing (*first revision*)

IS : 3648-1966 Hexagon fit bolts

IS : 3658-1981 Code of practice for liquid penetrant flaw detection
(*first revision*)

IS : 3664-1981 Code of practice for ultrasonic pulse echo testing by
contact and immersion methods (*first revision*)

IS : 3703-1980 Code of practice for magnetic particle flaw detection
(*first revision*)

IS : 7307 (Part 1)-1974 Approval tests for welding procedures,
Part 1 Fusion welding of steel

IS : 7310 (Part 1)-1974 Approval testing of welders working to
welding procedures: Part 1 Fusion welding of steel

IS : 7318 (Part 1)-1974 Approval tests for welders when welding
procedure approval is not required: Part 1 Fusion welding of steel

0.4 This standard is being published in three parts. Part 1 deals with inspection, testing and assembly at manufacturing stage, Part 2 deals with inspection and testing at the time of erection, and Part 3 deals with inspection, testing and maintenance after erection.

0.4.1 Part 1 is being published in two sections. Other section of this part will cover the hoists (*under preparation*).

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 1/Sec 1) lays down the recommendations for inspection, testing and assembly of radial gates at the manufacturing stage. It does not cover hoisting equipment.

*Rules for rounding off numerical values (*revised*).

2. GENERAL

2.1 All materials and components used for the work shall be new and free from defects and subject to the tolerances specified under this standard.

2.2 Complete inspection shall be made at the place of manufacture prior to despatch.

3. MATERIALS

3.1 All materials and components supplied by the manufacturer shall conform to the requirements of the latest relevant Indian Standards. In the absence of Indian Standard for any particular material or component, other specification mutually agreed to between the purchaser and the supplier may be used.

3.2 All materials used shall be of tested quality. Original manufacturer's test certificates for bought out items such as castings, forgings and seals, shall be furnished by the gate manufacturer to the purchaser on demand.

3.3 Castings

3.3.1 All castings shall conform to the relevant Indian Standards.

3.3.2 Visual examination shall be done to find out the general soundness of the castings and if required, non-destructive tests shall be conducted on the castings.

3.3.3 Repairs of major defects in castings by welding shall not generally be allowed, but if the strength and machinability of the casting can be ensured, the repairing may be undertaken with the approval of the purchaser.

3.3.4 Defective castings as permitted under **3.3.3** shall be heat-treated after repairs by welding, where deemed essential.

3.4 Forgings

3.4.1 All forgings shall conform to the latest relevant Indian Standards

3.4.2 All forgings shall be suitably heat-treated according to relevant Indian Standards

3.4.3 Visual inspection of forgings shall be done and the finished surface shall be smooth and free from defects. If required, non-destructive tests shall be conducted on the forgings.

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4. WELDING

4.1 All weldings shall conform to the relevant Indian Standards and approved electrodes shall be used.

4.2 Welding procedure for all major welds shall be drawn-up and carried out and if required by the purchaser, test pieces may be made to ensure the soundness of the welding.

4.3 Only tested welders shall be employed for the welding work.

4.4 Visual examination shall be carried out of all welded joints to ensure that welding is free from:

- a) cracks on the surfaces of the joints or parent metals located near the heat affected zones,
- b) undercuts in the parent metals,
- c) non-uniform width of fillet joints,
- d) misalignment and distortion of the welded member, and
- e) irregular reinforcing beads of welds.

4.4.1 Welds found to be defective shall be subjected to non-destructive tests to ensure soundness of welding.

4.5 Proper sequence of welding shall be followed for welding of heavy structural parts in order to minimize distortion.

4.6 Defective welds after testing shall be removed and rewelded.

4.7 All major stress carrying welded joints shall be subjected to suitable non-destructive testing, as specified by the purchaser.

4.8 Any item or part may be stress-relieved according to the requirements and procedure laid down in IS : 2825-1969*. Generally following items require stress-relieving.

- a) Yoke/trunnion girders, anchor girders and trunnion brackets where heavy welding is involved; and
- b) Trunnion hub if part of the arm (structural portion) is welded to the casting.

5. MANUFACTURING TOLERANCES

5.1 The gates and embedded parts shall be manufactured to such accuracy and tolerances as are required for the safe and efficient operation of the gates. Unless otherwise specified, the tolerances given in **5.2** and **5.3** may be used as a general guide.

*Code for unfired pressure vessels.

5.2 Embedded Parts

5.2.1 Deviation of any point on the face of seal seat from 2 m machined straight edge held against it shall not exceed 0.5 mm.

5.2.2 Deviation from straightness of the wall plate shall not be more than 2 mm in 2 metre length.

5.2.3 Offsets and gaps at any adjoining joints between seal seats, guides, etc, shall not exceed 0.5 mm.

5.3 Gates

5.3.1 The gate leaves with stiffeners shall generally be manufactured on a jig and fixture. The tolerance on the radius of gate leaf shall be $\frac{1}{1000}$ of radius or ± 10 mm whichever is less.

5.3.2 The distance between the side guide roller/guide shoes on one side of the gate to the corresponding guide roller/guide shoes on the other side shall not vary from dimension shown in the drawings by more than $+ 0.00$ mm to $- 2.00$ mm.

5.3.3 Parallel distance of centre line of both the trunnion bearings from upstream bottom edge of skin plate shall not vary more than ± 3.0 mm.

5.3.4 The horizontal distance between the centre to centre of trunnions shall not vary from the dimension shown in the drawings by more than ± 3.0 mm.

5.4 Connections -- At all splices, the holes shall be match drilled. If fit bolts are provided, holes shall be reamed at assembly.

6. SHOP ASSEMBLY AND TESTING

6.1 Gates and Embedded Parts — The anchor girder together with the tie bars of convenient length for testing and yoke girder shall be load-tested equivalent to 1.5 times the design load before erection. The load shall be applied gradually by means of hydraulic jacks and the assembly shall remain under load to enable all the observations required by the test procedure to be made.

6.1.1 Assembly of wall plates and sill beams shall be done at shop.

6.1.2 Gates shall be assembled complete with guide rollers and trunnions for proper alignment and inspection. All the dimensions specified in 5.2 and 5.3 and other central dimensions shall be checked on assembly.

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6.1.3 Side guide rollers may be shimmed, if necessary, to maintain the required tolerances as specified in 5.3.2.

6.2 Seals — Seals may be assembled either at shop or during erection according to the convenience of the manufacturer. The holes in seals shall be match drilled with seals base and clamps.

6.3 Ballast — Ballast if required, can be provided either at shop or at site.

6.4 Marking

6.4.1 All erection marks shall be hard-punched.

6.4.2 All the components shall be match-marked before dismantling.

7. CLEANING AND PAINTING

7.1 Surface shall be cleaned thoroughly, preferably by sand, shot blasting.

7.2 Painting shall be as specified by the purchaser and the application procedure shall be as recommended by the paint manufacturer

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